**U.S. Forest Service**

**Fire and Aviation Management**

### Communication Plan

**Date:** June 2, 2017

**Topic:** Planning for Smoke and Responding to Air Quality Impacts from Prescribed Fires and Wildfires

**Background:**

**Key Messages:**

* Fire plays an important ecological role in wildlands across the United States and with fire, smoke is always present.
* Smoke is an important concern for the U.S. Forest Service when conducting prescribed fires and responding to wildfires because it can have significant public health and safety impacts.
* As compared to wildfires, prescribed fires are shorter in duration and are conducted under weather conditions that minimize the impacts of smoke on the public.
* The U.S. Forest Service takes many actions to minimize and mitigate public health and safety impacts of smoke from prescribed fires and wildfires.
* People who suffer from illnesses that are exacerbated by smoke, or who are sensitive to smoke, should take steps to protect their health and reduce their exposure to smoke generated by prescribed fires and wildfires in their areas.
* Smoke can reduce visibility on roadways and drivers should exercise caution when driving in smoky, low-visibility conditions.
* Wildfire smoke can adversely affect recreation and tourism opportunities in locations such as Wilderness Areas and other scenic locations.
* Information about air quality is readily available to the public from many sources, i.e. <https://airnow.gov/>.

**Questions & Answers**

**What is wildland fire smoke?**

Smoke results from the combustion of forest fuels, which are carbon-based compounds, both organic and inorganic. As the smoke interacts with the atmosphere, intermediate chemicals also are formed. As a wildland fire progresses through its burning phases, different compounds/chemicals are released.

**What does smoke from wildfires and prescribed fires contain that can be harmful to human health?**

Smoke from wildfires and prescribed fires contains particulate matter (PM); trace gases that can be transported downwind and react in the presence of sunlight to form ozone, and; other compounds including acrolein, carbon monoxide, formaldehyde, and benzene. Numerous studies have demonstrated that all of these can negatively impact human health. Ozone can also negatively impact plants and animals.

**What is particulate matter?**

Particulate matter is any solid or liquid particle less than 100 microns in diameter that can be suspended in the atmosphere. Particulate matter is often abbreviated as PM, followed by the size of the particle. When regulating air quality to protect health, PM 10 and PM2.5 are the particle sizes of greatest concern. These small particles have the potential to travel longer distances than larger particles, and are more difficult for the body's defenses to filter. Of these, PM2.5 has the greatest potential to affect human health over time. PM2.5 refers to fine particulate matter with an aerodynamic diameter equal to or less than 2.5 microns in size. Because of their small size PM2.5 can be drawn [deep into the lungs](https://www.frames.gov/documents/smoke/Particles/engage.html) upon inhalation. More information about particulate matter pollution is available from the EPAat https://www.epa.gov/pm-pollution.

**What type of PM does smoke from wildfires and prescribed fires contain?**

Approximately 70% of all particulate matter emitted by biomass burning are less than 2.5 microns in diameter.

**What types of health impacts can exposure to PM 2.5 have?**

Exposure to high concentrations of PM2.5 can have both short and long term effects. Short term effects include respiratory impacts (i.e. shortness of breath and coughing), changes in heart rate variability, and irregular heartbeat. Long term exposure effects include reduced lung function, chronic lung disease in children, and premature death in people with heart and lung disease.

**What types of health impacts can exposure to ozone have and where would ozone levels be a concern?**

Short term exposure to ozone can cause coughing, pain upon deep breathing, reduced lung function, and shortness of breath. Long term exposure to ozone is associated with reduced lung function. Most rural locations in the U.S. don’t have ozone pollution issues whereas ozone is commonly found to be higher in urban areas.

**Are some people more impacted by smoke than others?**

Older adults, children and people with heart or lung disease (including asthma) are more vulnerable to the adverse health effects of air pollution from wildland fire. Recent science indicates that pregnant women are also potentially vulnerable to adverse health effects of air pollution from wildfires both as individuals and the potential for adverse effects to their fetus. These sensitive groups as a whole are at greater risk to lower levels of air pollution as compared to healthy individuals. Sensitivity to smoke varies significantly between individuals and a health care provider can help address one’s vulnerability and best response to smoke. Communities located downwind from a burn, or in a low lying area where smoke may settle will be more affected by emissions.

**What can sensitive and healthy individuals do to prevent adverse health effects of smoke?**

If living in an area where wildfires occur regularly or when there is heightened fire risk due to drought conditions, or if prescribed fires are planned in their area, sensitive individuals may wish to prepare in advance for possible smoke impacts. Such preparations could include developing a written asthma management plan for those with asthma and for people with heart disease and checking with their local health department or health care providers about precautions to take during smoke events.

If heavy smoke or long duration smoke from a wildfire is forecasted for your area, sensitive or more vulnerable individuals may consider leaving the area. Healthy individuals should also be aware of their own physiological response to smoke and if levels are very high, exposure reduction should be considered and rigorous outdoor activity reduced. If a sensitive individual stays in the area, it is recommended to reduce exposure to the smoke by staying inside with an adequate supply of medication (more than five days) and food. In advance of the smoky conditions, establish a clean air room or home conditions which maintain clean air by using HEPA filters on air conditioners which recirculate inside air (not pulling in smoky outside air) or use of HEPA clean air filtering devices. Make sure the filtration device is not the type that creates ozone. It is always advised for sensitive individuals to consult their healthcare provider for evaluation of their best course of action and appropriate protective measures.

If heavy smoke is present, those who are more vulnerable should take precautions such as staying inside and avoiding prolonged outside activity. Your own body and its response is the best indicator of response to the smoke. People should keep in mind that smoke impacts can change quickly. Contact a health care provider if your condition worsens when you are exposed to smoke. Additional information can be found in *Wildfire Smoke, A Guide for Public Health Officials, Revised May 2016 (*<https://www3.epa.gov/airnow/wildfire_may2016.pdf>). The guide is designed to help local public health officials prepare for smoke events, to take measures to protect the public when smoke is present, and communicate with the public about wildfire smoke and health.

**What types of health impacts can exposure to compounds including acrolein, carbon monoxide, formaldehyde, and benzene have?**

All of these compounds have the potential to be harmful to humans when present in sufficient quantities, although there is no indication that the public is typically exposed at harmful levels due to wildland fire smoke. The danger these substances pose depends on the duration of exposure, and the quantities present (i.e. their concentration). More study is needed to fully understand the hazards these and other compounds may pose in the concentrations present in wildland fire smoke.

**How can I check air quality in my area?**

The public can learn about air quality conditions in their area at EPA’s AirNow site (https://[airnow.gov](http://www.airnow.gov)). Air quality conditions are displayed in EPA's Air Quality Index, or AQI, which is a simple color-coded scale that indicates the human health implications of current air pollution concentrations. The site also has a page focused on fires (<https://airnow.gov/index.cfm?action=topics.smoke_wildfires>) where information about active fires and alerts as well as recommendations for how to protect oneself from smoke can be found. State and local air agencies, public health agencies and the local National Weather Service can also provide information.

Emergency smoke monitors are available as part of the U.S. Forest Service’s Wildland Fire Air Quality Response Program and may be deployed in areas which don’t routinely have air quality monitoring. If a monitor is deployed by an Air Resource Advisor who is part of the Program, the measurements will also be made available to the public along with the local smoke forecast through a variety of venues including a state’s smoke blog if one is established.

**Are transportation safety concerns higher in some areas of the country than others?**

Wildland fire smoke can reduce visibility and cause dangerous conditions on roadways and aviation travel routes anywhere in the U.S. This limited visibility increases the risk for firefighters working along these corridors and causes safety issues for the public attempting to travel through these areas. These conditions can result in vehicle accidents and grounded flights. Reduced visibility from smoke is especially a concern in the Southeastern U.S. where "whiteout" conditions can occur when smoke is combined with fog found during low wind speeds and high humidity. This “whiteout” condition is called superfog and although more frequent in the Southeast, can occur across the U.S. Smoke movement varies with meteorological conditions, and has the potential to move quickly onto roadways, leaving little opportunity to warn motorists of the dangerous conditions. People should exercise care and slow down when driving in smoky, low-visibility conditions and if superfog conditions are encountered, pull over and wait for the smoke to clear or avoid the area.

**What are the primary laws that govern air quality?**

The core of air quality regulations is the Clean Air Act (CAA). The CAA was issued by the U.S. Congress, and calls for the Environmental Protection Agency (EPA) to protect public health by creating air quality standards, rules, and policies. It is then up to states, tribes, and local governments to create and enforce laws to meet these standards. States and Tribes may also issue more stringent air quality regulations than those mandated by the EPA. States may further delegate implementation to counties, or air pollution control districts. Section 118 of the Clean Air Act requires federal agencies to comply with air quality standards and regulations to the same degree as any non-governmental entity.

States are also required to draft State Implementation Plans (SIPs) and tribes may draft Tribal Implementation Plans (TIPs) detailing how they will maintain air quality. These plans are then submitted to the EPA for approval. To ensure such plans are successful, States and Tribes operate monitoring networks of instruments to record data on air quality. By law, these data are recorded and stored to monitor the success of meeting air quality goals, and are submitted to EPA to demonstrate compliance with Federal standards.

**What are the National Ambient Air Quality Standards and what do they have to do with wildland fire?**

The National Ambient Air Quality Standards, or NAAQS, are one of the key aspects of the CAA used to maintain or improve air quality. These standards put a cap on the amount of certain pollutants, referred to as criteria pollutants, which are allowed in the atmosphere. The pollutants and their standards have been set by the EPA in response to the latest available research on air quality and human health.

The criteria pollutant most relevant to fire is fine particulate matter (PM2.5). Fires have the potential to emit large quantities of these pollutants sufficient to affect public health, and hinder a State's compliance with air quality regulations. Every five years the EPA reviews the latest available science regarding air pollutants and human heath, and revises the NAAQS accordingly. When this revision is finalized varies by the pollutant. Increasingly stringent standards may make it more difficult to conduct prescribed burns.

**What is a Nonattainment Area and how can it impact prescribed fire?**

Nonattainment Areas are areas where the measured concentrations of pollutants are greater than, or exceed, the NAAQS. Nonattainment status leads to more stringent pollution control and permitting requirements for sources within a nonattainment area. Prescribed burning activities in and around a nonattainment area could be subject to additional restrictions and controls, and are required to comply with additional regulations such as the General Conformity Rule.

**What is the Regional Haze Rule and how can it impact prescribed fire?**The Regional Haze Rule exists to protect visibility in Class 1 Areas, which are designated by Congress and have special significance and value to the public, including many national parks and wilderness areas. The Regional Haze Rule requires States to participate in planning to reduce haze regardless of whether or not they have a Class 1 Area within their borders because pollutants that contribute to haze that are emitted in one State can be transported into other States. States must develop long term strategies to create emission reduction measures for all pollutant sources, including prescribed fire, and demonstrate reasonable progress in meeting visibility goals.

**What is General Conformity and how does it relate to wildland fire?**

To help ensure States and Tribes meet air quality standards, Federal agencies operating within their boundaries must not engage in activities that could put the meeting of these standards at risk in [federal non-attainment areas](https://www.frames.gov/onlinecourses/mod/page/view.php?id=2991). Specifically, the General Conformity Rule is in place to prevent air quality impacts of federal actions from causing or contributing to violations of the National Ambient Air Quality Standards (NAAQS) or interfering with the purpose of a State, Tribe or Federal Implementation Plans (SIP, TIP, or FIP). For agencies engaged in prescribed burning within nonattainment areas, prescribed fires conducted in accordance with a smoke management program or using Basic Smoke Management Practices are presumed to conform. Wildfires fitting the definition of emergency may be exempt from General Conformity requirements.

**What is the Exceptional Events Rule and how does it relate to wildland fire?**

If a State adequately demonstrates to EPA that emissions from an exceptional event, including wildfires and prescribed fires, has caused an exceedance or violation of National Ambient Air Quality Standards (NAAQS), then that data can be excluded from regulatory determinations such as nonattainment designations with concurrence of the EPA Administrator. Currently, wildfires can frequently contribute to NAAQS exceedances for ozone and PM2.5 while prescribed fire rarely contribute to exceedances.

**Why is it necessary for the U.S. Forest Service to intentionally create smoke by igniting prescribed fires?**

Prescribed fire is a valuable land management tool used to reduce the risk and severity of wildfire and meet other natural resource management objectives such as maintaining habitat for endangered species. Wildfires pose a direct threat to air quality and public safety—threats that can be mitigated through management of wildland vegetation. Thinning, prescribed fires, and other types of fuel reduction methods can help prevent severe wildfires with minimal impacts to air quality while uncontrolled emissions of smoke from severe wildfires may pose significant risks to public health and safety for long periods. The use of prescribed fire can influence the occurrence of wildfires which may help manage the contribution of wildfires to air quality.

**What does the U.S. Forest Service do to mitigate or prevent prescribed fire emission impacts on air quality?**

The U.S. Forest Service requires its prescribed fire burn bosses to take established course work so they are prepared to manage smoke effectively. They address prescribed fire smoke though a number of actions such as evaluating smoke dispersion conditions, monitoring effects on air quality, communication and public notification, considering emission reduction techniques, and coordinating area burning. By policy, these actions include using basic smoke management practices (BSMPs) to mitigate or prevent prescribed fire emission impacts on air quality. BSMPs can protect the public from smoke exposure, help avoid an exceedance of a National Ambient Air Quality Standard (NAAQS) and minimize impacts on sensitive areas such as Class 1 Areas.

The U.S. Forest Service coordinates with other burners and air quality regulators to help prevent poor air quality conditions. In areas where prescribed fire is or has the potential to be a significant source of air pollution, smoke management programs have been developed in collaboration between air quality regulators and Federal, State, Tribal, and private land managers.

**What does the U.S. Forest Service do to mitigate or prevent wildfire emission impacts on air quality?**

The U.S. Forest Service may consider air quality impacts of wildfires when determining strategies and tactics. On long duration or high impact smoky wildfires, a technical specialist position identified as an Air Resource Advisor, may be utilized to aid in addressing air quality issues related to the wildfire smoke and to aid with interagency coordination in helping to address public concerns and help to reduce public exposure to the smoke.

**How does the U.S. Forest Service evaluate smoke dispersion conditions?**

Evaluating how smoke will disperse from a fire can be done in many ways, such as identifying smoke sensitive receptors, using smoke modeling to determine where the smoke will go and its degree of impact, and using readily available meteorological forecasting of conditions that aid in good smoke dispersion. The agency strives to take steps that will promote smoke dispersal away from sensitive areas (highways, communities, airports, scenic vistas, Class 1 Areas, non-attainment areas, etc.) and prevent ground level accumulations.

**What techniques can be used to reduce emissions from prescribed fires?**

There are several ways to reduce emissions, including reducing the fuel load mechanically or by grazing; reducing the fuel burned by burning in high moisture conditions, implementing mop up quickly after a burn, or by burning before new fuels emerge; increasing burning efficiency by using methods that generate greater heat allowing the materials to be consumed by fire more completely, such as pile burning, back fires, and burning in dry conditions; and increasing burn frequency to reduce fuel accumulation resulting in less biomass being burned.

**What are Air Resource Advisors and what do they do?**

During a wildfire, Air Resource Advisors (ARAs) monitor smoke impacts, help forecast smoke impacts and make it easier to address air quality on incidents and in the decision making processes (risk, strategy, tactics). They focus on smoke impacts to public health and safety; transportation safety (roads and aviation, for public and fire personnel); and when needed, on smoke exposure to fire personnel. Air Resource Advisors provide information to public and fire personnel as well as support partners (air quality, health departments, county, tribal govt.) to address air quality concerns.

**Why is it important for the U.S. Forest Service to coordinate with other burners?**

Coordinating and planning ignitions and cooperatively limiting burning when needed is important to ensure that the ability of the atmosphere to disperse smoke from the burns is not overwhelmed and to help prevent cumulative or adverse downwind impacts from smoke. Forming or joining state prescribed fire councils (http://www.prescribedfire.net/) is a common and effective approach to sharing the airshed and coordinating with other burners.

**What is a Smoke Management Program (SMP)?**

The purposes of SMPs are to mitigate smoke intrusions into populated areas and smoke on roadways and at airports; prevent deterioration of air quality and exceedances of NAAQS (protect public health); and address visibility impacts in mandatory Class I federal areas. The SMP has elements of basic smoke management practices (BSMPs) as a core with a more structured approach to organization and participation. A SMP can either be voluntary or mandatory based on the needs of the respective State, Tribal land or area.

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